MARINE REVIEW.

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Steel Ship Building on the Lakes.

We are accustomed to speak of steel ship building on the lakes (and when we say steel iron is meant also) as an industry developed within a few years. To a certain extent this is true, as it is only fourteen years since the Onoko, the first of the steel ore carriers was built at the Globe works, Cleveland. The Onoko was really the forerunner of the immense fleet of steel steamers now engaged principally in carrying ore and grain, but the credit of demonstrating the advantages of steel ships in these waters is due to the managers of the Anchor Line of Erie, Pa., who built at Buffalo, as early as 1862, the screw steamer Merchant of about 1,300 tons capacity. After a succesful career of about twenty years, the Merchant was wrecked on Racine reef, Lake Michigan, and became a total loss. Her machinery was recovered and placed in the steam barge A. L. Hopkins, built at Marine City.

Again in 1868 the same company built at Buffalo the steamer Philadelphia, of about 1,600 tons capacity, which was lost by collision with the steel steamer Albany off Point au Barques, Lake Huron, only three years ago, both steamers going to the bottom in deep water. Other steamers built by the Anchor line between 1871 and 1873 were the Alaska, Arabia, India, China, Japan, Java, Cuba, Russia and Scotia. All of these were built at Buffalo, fully establishing the claims of that city regarding this industry. The Java, Cuba, Russia and Scotia were twin-screw steamers. The Cuba and Russia are still in commission and are good seaworthy vessels. The Java was lost in Lake Michigan in the vicinity of Point Betsy from the bursting of one of her steam pipes, caused by a broken shaft. The Scotia was wrecked on the extreme east end of Keweenaw Point, Lake Superior, and became a total loss.

Although the ship yard of the Detroit Dry Dock Co. at Wyandotte is the oldest of the steel plants on the lakes now in operation, most of the steel vessels referred to above were built before anything in this line was done at Wyandotte. A steel tug, the Eber Ward, which was taken down the St. Lawrence and around to New Orleans, where she is now engaged in towing between New Orleans and the Gulf of Mexico, was built at Wyandotte as early as 1872, but the Boston, a steel freight steamer for the Western Transit Co. was not built at that place until 1880. Four years later, in 1884, the Albany was built at Wyandotte, but by this time considerable progress had been made at Cleveland also with the construction of steel ore and grain carriers of the kind that are now built in large numbers at Buffalo, Cleveland, Detroit, West Bay City, Toledo, West Superior, and Chicago.

All the steel side-wheel steamers built up to date—with the exception of the Darious Cole, built in Cleveland, the City of Chicago, built at Bay City, and the City of Toledo, built at Toledo—have been built at Wyandotte.

Probably ninety-nine out of a hundred stories told in the newspapers about John D. Rockefeller's business plans are absolutely without foundation of any kind. Some time ago the Johnson Steel Co. of Lorain attempted to float bonds to the extent of $5,000,000 for improvement and enlargement of their property. It was said that the Central Trust Co. of New York had taken half of this issue of bonds and that the purchase was for Mr. Rockefeller. Now that concerns like the Johnson company are hard pushed for money to carry on big operations there are all sorts of rumors afloat about Mr. Rockefeller coming into control of the Lorain works, but leading business men of Cleveland, who are acquainted with the kind of investments that Mr. Rockefeller has taken up, say that they do not think he would have anything whatever to do with a manufacturing plant like that at Lorain. To buy the bonds of such a concern, in a limited way, they say, is one thing, but to undertake all of the details of its management in competition with other strong organizations, is another matter. It is quite generally understood among leading men in the iron industry that Mr. Rockefeller is not disposed to go into the business of making pig iron, building rolling mills, etc., whatever he will do later on about providing docks for the storage of ore and to facilitate the management of his ships.

Picking Up Tows in Canadian Waters.

On Oct. 1, 1895, the schooner Samuel P. Ely anchored in Canadian waters off Amherstburg. On the following day the steam barge E. B. Hale took the Ely in tow without reporting to the Canadian cutoms department. For failure to report and clear a fine of $400 was imposed against the E. B. Hale. The matter was taken up with the Canadian customs department, and after considerable correspondence between the attorneys for the vessel and the commissioner of customs, the fine was mitigated to $50. The commissioner says: "In future the law must be strictly complied with by all boat owners."

Section 111, revised customs act, 49 Vic., cap. 32., as amended by 51 Vic., cap. 14, provides: "The governor in council may, by regulation, declare any trade or voyage on the seas, rivers, lakes or waters, within or adjacent to Canada, whether to or from any place within or without Canada, to be a coasting trade or a coasting voyage within the meaning of this act, etc.," and gives the governor in council general authority and discretion to dispense with the requirements of the act.

Section 113 provides: "If any vessel is found hovering in British waters, within one league of the coasts or shores of Canada, any officer of customs may go on board and enter into such vessel and stay on board such vessel while she remains within the limits of Canada or within one league thereof; and if any such vessel is bound elsewhere, and so continues hovering for the space of twenty-four hours after the master has been by such officer of cutoms required to depart, such officer may bring the vessel into port, and examine her cargo, and if any goods, the importation of which into Canada is prohibited, are on board, such vessel with her apparrel, rigging, tackle, furniture, stores and cargo, shall be seized and forfeited; and if the master or person in charge refuses to comply with the lawful directions of such officer, or does not truly answer such questions as are put tc him, respecting such ship or vessel or her cargo, he shall incur a penalty of $400."

Section 6, chapter 21, Canada customs, orders in council, provides: "Foreign vessels may tow other vessels or things from a Canadian port to a foreign port, but having parted from such vessels or things, or any of them, in Canadian waters, they can not again take such vessel or things in tow to move them further in Canadian waters, but this and the preceding rule (similar but covering towing from a foreign port to a Canadain port) are not to apply to an accidental parting of such vessel by breaking hawser or other temporary damages." The penalty is fixed at $400.

Under these sections it would seem that the fine was not justly imposed against the Hale, as she had not towed the Ely into a Canadian port, but it appears that the master of the schooner made inquiry of the collector, advising him that the Hale would take the Ely in tow, whereupon the collector advised him that the Ely need not report but the Hale must "report and clear," and the captain of the schooner said he would advise the Hale's captain. The Hale did not report and clear, and the fine was imposed against her. Whether the fine was properly imposed or not under these sections of the Canadian customs regulations, is now immaterial, but the commissioner having declared an intention to enforce them in the future, masters will have to govern themselves accordingly.

It is understood that whatever may be done regarding four vessels of the Bessemer line yet to go into commission, arrangements have been made whereby the twelve boats now in service—six steamers and six barges—will be kept running during practically the whole season. The whaleback tows of this line, which have been in commission all season—Neilson and Whitworth, and Cort and Russell—have each made seventeen trips between the head of Lake Superior and Ohio ports. They have been in the ore trade exclusively and have been averaging about eight and a half days to a trip. The steamer Bessemer, which was the first of the new boats to come out, has made nine trips from Duluth to Ohio ports since July 10.

Car Ferry Pere Marquette.

An engraving on this page will give an idea of the finished appearance of the new car ferry Pere Marquette, under construction at the ship yard of F. W. Wheeler & Co., West Bay City, Mich. This is the vessel that is to be used for both winter and summer service by the Flint & Pere Marquette Ry. Co., between Manitowoc and Ludington on Lake Michigan. Her length between perpendiculars is 331 feet, over all length 350 feet, beam 56 feet, depth below main deck 19½ feet, depth from upper deck to floor 37 feet. The steel frames and plating will extend from bilge to upper deck, and the main and upper decks also are to be of steel. About 2,700 tons of steel will be used in her construction. The bow of the new steamer is to be double-plated with ¾-inch plates for a distance of 30 feet abaft the stem, and this double-plating will extend 3 feet above the load line. To resist the great pressure of ice shoves, channel beams thoroughly secured both vertically and horizontally will span the hull at close intervals about midway between the floor and main deck. The hull will have six water-tight compartments but no water bottom. A shield of forged steel will afford protection for the rudder, and the shafting of the two after wheels will be housed in as on the Northern line steamers North Land and North West. A more extended description of this steamer, with engravings made from working drawings, will be found in the Review of Jan. 16, 1896.

Survival of the Beam Engine.

Beam engines have been called old-fashioned, even to the point of ridicule. Their use on American river steamers, for example, has called out a good deal of adverse criticism from English steam engineers, who have contended that American practice was half a century behind, and that beam engines were superseded in English practice long ago. But, like some other superseded inventions, they come back again when innovations have run their course. The popular idea of beam engines, in America as well as in England—that they are nearly obsolete, and have given way to better forms of construction—is not true, and never can be until the same functions are attained in other designs; not for all uses, but for a large share of cases. The reciprocating elements of beam engines are in equilibrium, balanced on a scale beam, so to speak; the piston is suspended in the cylinder, so as to wear equal on all sides, and the links or connections make only a slight angle, so that there are no considerable lateral strains. The same remark applies to the crank connection, which is long, without a corresponding waste of room. The various pumps are worked directly from the beam, with only motion rods for gearing, and the machinery,as a whole,occupies a long, narrow space, fore and aft in vessels, and is set on edge so to speak. The principal strains are taken up on vertical lines, falling in the plane of best resistance, that is, normal to the foundation.—George L. Clark, in Cassier's Magazine.

Mr. William A. Fairburn, the young naval architect, who for the past six years has been in the employ of the Bath Iron Works as draughtsman, leaves this country next week for a seven months' trip to Europe.

Reduced rate tickets are offered for sale by the Nickel Plate road to points in Michigan, Wisconsin and the southwest for the benefit of hunting parties. 337 Nov. 1.

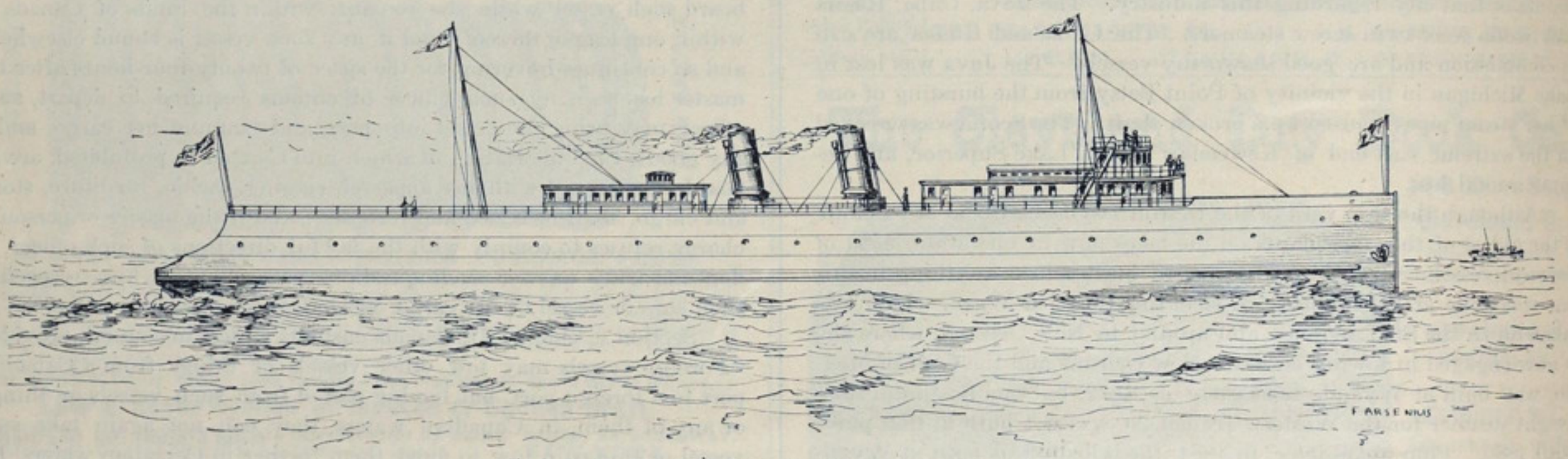
Notes from the Hydrographer about Lake Navigation.

Commander Sigsbee, U. S. N., chief of the hydrographic office, spent some time recently on lake vessels. His observations, as noted in a letter to one of the vessel managers, are interesting. He says:

"I had a very pleasant time on my tour of the lakes. I visited Buffalo, Cleveland, the Sault, Duluth, Mackinac island and Chicago, changing vessels at each place and taking vessels as they came. I found the captains of the lake vessels just as I had expected to find them, thoroughly capable in handling their vessels, while I was surprised to find that there were practically no pilots on the lakes, each captain piloting his vessel himself. As a rule, the captains recognize the importance of the determination of compass errors from observations on board, so that the officers of vessels may be more independent of ranges. The interest shown in this direction was greater than I had expected. But little more, in the way of instruments,is required than to furnish each vessel with azimuth circle for her compasses. A table of true bearings is already published by the hydrographic office. One difficulty in the way, however, lies in the fact that the mariners of the lakes have depended so greatly on ranges that they have not familiarized themselves, as a rule, with the methods of reducing courses according to the practice that maintains on the ocean. The sea-going man, by reason of the nature of his cruising, has need to be more independent of outside artificial aids than his brother on the great lakes.

"It is also recognized on the lakes, although with more doubt, that the study of storm movements would lead to good results. I found the captains had acquired, through long experence and close study, a knowledge of the working of storms which they might have acquired in short order in their younger days by simply looking into the subject of the law of storms, in the same way that is now universal among sea-going people.

"This office is just publishing a supplementary notice to mariners, treating of the question of storms on the lakes. The pamphlet is not what I had desired; in fact I had intended to write it myself expressly for the mariner's point of view, but I was so loaded down with work as not to be able to fulfill my desire. Therefore, I laid some notes before a very able young meteorologist in the office who did remarkably well under the circumstances."



F. & P. M. RY. CO'S CAR FERRY PERE MARQUETTE.

Society of Naval Architects and Marine Engineers.

Frances T. Bowles, secretary, announces that the third general meeting of the Society of Naval Architects and Marine Engineers will take place in New York city, at 10 a. m., Thursday, Nov. 12, 1896. Through the courtesy of the president and managers of the American Society of Mechanical Engineers, the meetings will be held in the auditorium of No. 12 West 31st street, the sessions continuing through Thursday and Friday, Nov. 12 and 13. On Friday Nov.13 there will be a banquet, of which subsequent notice will be given, and to which members and their guests are cordially invited. Members intending to propose candidates for membership are requested to notify the secretary, in order that the necessary blank forms of application may be forwarded and properly filled out. Papers to be read at this meeting should be forwarded to the secretary as soon as possible. The usual notice giving assignment of papers will be issued about Nov. 1.

The Nickel Plate road offers excursion rates to points in Wisconsin, Michigan and the southwest for hunters. 338 Nov. 1.

Screw Propeller Designing.

Editor Marine Review:—I have just seen a book on "Screw Propellers," published in New York by Mr. Chase. It is a very useful book, but there is a sentence on page 60 which I may be pardoned for correcting. Mr. Chase says: "It is very doubtful whether there will ever be devised a formula that can universally be applied to determine the best form and the most advantageous dimensions for a screw propeller under any given set of conditions." Permit me to say that Mr. Chase is mistaken here, for I worked out such formulae three years before Mr. Chase's book was published. The fact was noted in the engineering papers about August, 1892. There was no need to advertise it, for the mere announcement brought me many requests to design propellers, and those requests have continually increased, thus sufficiently proving the usefulness of my system in saving coals and increasing speed. I suppose, however, no mention of my system appeared in American papers, or Mr. Chase would have heard of it. Sir C. Purcell Taylor, Bart., D. Sc.

2 Poweis Place, Queen Square,
London, W. C., Sept. 9, 1896.

Enquirer—Say When Steam Yacht Race.

Editor Marine Review:—As no authentic data concerning the performance of the steam yachts Enquirer and Say When in their recent race has been brought to light, I embrace this opportunity of giving the interested readers of the Marine Review the benefit of my investigations. The steam yacht Say When was built by the Herreshoff Manufacturing Co. in 1888, for Mr. Norman L. Munroe. On her speed tests she attained a speed of 17.25 nautical or 19.86 statute miles per hour (in dead water) with 320 revolutions, 213 pounds steam pressure, and 603 I. H. P. At this time the vessel was fitted with a Herreshoff boiler and the displacement performance constant on this test was 178.4, which agrees perfectly with the estimated performance given in my letter of Aug. 27. The engine of the Say When is of the five cylinder quadruple expansion type, the cylinders being 11½, 16, and three at 22½ inches diameter by 15-inch stroke, and the engine was designed (for U. S. S. Cushing) to develop 800 I. H. P. to 350 revolutions.

I must differ with Mr. Roberts in some of the statements he made in his letter of Sept. 3. The Say When was not rejected by Mr. Munroe and thrown on the hands of her builders, because she failed to make the speed contracted for, but she was accepted by that gentleman and afterwards sold by him to Hon. W. J. White of Cleveland. I do not mean by this that the Say When, when built, was a success as regards speed, for she certainly was not, the reason being that her original boiler power was only three-fourths that of the engine and instead of a speed of 22 statute miles per hour only 20 was attained. Soon after he bought her, Mr. White had the Herreshoff boiler removed from the yacht and the Roberts boiler of less power substituted. Now a mere glance at the dimensions and the particulars of the Roberts boiler (as published in the Review) now fitted in the Say When is sufficient to convince any experienced person that it is much too small to do the work required. Mr. Roberts states that his boiler showed itself to be the superior in the recent steam yacht race, as it furnished steam for a much larger engine than did the Taylor boiler fitted in the Enquirer. The great trouble is that the Roberts boiler failed to do this, and being capable of supplying steam to an engine of only 450 I. H. P. it certainly could not furnish sufficient steam for an engine capable of developing over 800 I. H. P. I must confess that I can not see how the low pressure cylinders of the Say When's engine are a drag upon the rest of the machine, as cards taken on her speed trials show that these cylinders indicated 65 and 90 I. H. P. respectively out of the total of 603.

After trying to convince us that the Roberts boiler in the Say When is quite capable of supplying all the steam necessary, Mr. Roberts wishes to know what the result would have been if the yacht had been fitted with a Roberts boiler of ample size. I think I can inform him, for I firmly believe that if the Say When was in good first-class condition and had the steam necessary to turn the engine 350 revolutions per minute—that is work the engine to its full designed power—she would attain a speed of 21 statute miles per hour; and moreover there is ample room in the Say When as regards height, width and length, in which to place a water tube boiler of 800 H. P., using forced draft.

I have in my possession the result of the speed tests of the Herreshoff-built steel steam yacht Ballymera, which is fitted with an engine similar to that in the Say When. She was designed, however, for a speed of 18 statute miles with 600 I. H. P., and two Almy water tube boilers were fitted with 49.86 square feet of grate and 1,721 square feet of heating surface to furnish the steam necessary for the power. The Ballymera is twice the size of the Say When, having displacement of 183 tons, but she attained a mean speed of 18.35 statute or 15.93 nautical miles (which is six-tenths of a mile more than the speed of the Say When in her recent race) with 620 I. H. P., 325 revolutions and 220 pounds steam pressure. Let us compare the performance of the Enquirer with that of the Orienta, another Herreshoff-built yacht and a boat of about the same size and power as the new Buffalo-built yacht:

	Enquirer.	Orienta
Approximate displacement	162 tons	152 tons
Length on water line	126′ 0″	117′ 0″
Beam	16′ 6″	17′ 0″
Draft	7′ 0″	7′ 0″
Speed, statute miles	17.83	18.73
Speed, nautical miles	15.48	16.27
Engine	10½-17-27	12½-18-30
	16	18
Revolutions	325	184
Steam	250	215
I. H. P.	640 est.	623
$\frac{\text{I. H. P.}}{D^{\frac{2}{3}} \times S^3}$	172	196
Boiler.	Taylor.	Almy.
Grate surface	51	47.7
Heating surface	2,200	1,658
Weight without water	24,640	20,520
Floor space occupied	103″x103″	106″x89″

I use the figures for the Enquirer's boiler as stated by Mr. Ballin in his valued letter of Aug. 18. The figures in this comparison speak for themselves. The Taylor boiler weighs 38.5 pounds per I. H. P. and the Almy but 32.9 pounds. The Taylor boiler occupies 16.5 square inches floor space per I. H. P., and the Almy but 15.1, or in other words the Almy boiler of less weight, heating and grate surface, and occupying less floor space, could take the place of the Taylor boiler in the Enquirer and do the same work. There are probably other boilers in the market to-day that could do about the same thing, but I merely mention these facts, which have come under my notice, to prove to the interested ship builders and marine engineers on the lakes that the Tyalor boiler is not by any means something phenomenal. The power of a boiler can not be judged by heating surface only, and I am of the opinion that the Taylor boiler could be improved by less heating surface arranged more efficiently. I should not be surprised if much of the heating surface in the Taylor boiler becomes overheated by not having proper circulation.

In examining the cut of the Taylor boiler, the question arises, How do you repair this boiler without tearing it all to pieces, and what would be the result of any part of it giving out at sea? This question is too often ignored, and yet it is one of the most important and essential features in a good water tube boiler design. I guess I will stop now, as I have already written more than I had intended.

Bath, Me., Sept. 18, 1896. William A. Fairburn.

Editor Marine Review:—Since writing you under date of the 18th, I have received your issue of Sept. 17, which contains some valuable data on the recent Enquirer-Say When race. The actual I. H. P. of the Enquirer is stated as 634, whereas I estimated it as 640. This slight difference will not affect the figures and comparisons made in my previous letter. The length of the course is, however, quite an item, and if 29½ miles, the speed of the Enquirer would be 18.78 statute or 16.30 nautical miles per hour, whilst that of the Say When would be 18.69 and 16.23 respectively. The displacement of the Say When at 6 feet 4 inches draft is about 101 tons, and this slight difference of five tons is not sufficient to materially alter the figures given in my previous letter, especially when we consider that the draft and displacement of the boats are, to a certain extent, approximate. The displacement performance constant of the Enquirer, according to the new figures, is nearly 203, a truly remarkable performance for a boat of her size. This is, however, apt to vary somewhat as she may not have been down to her load line on her recent trial.

Bath, Me., Sept. 21, 1896. William A. Fairburn.

More Facts About Miles.

Editor Marine Review:—In the note published in the Marine Review of Sept. 3, 1896, under the heading "Knots and Miles," occurs the sentence, "The prevailing idea at present appears to be that the knot is the same thing as the geographical, nautical, or sea mile; and the word knot is used to prevent any possible confusion with the statute land mile."

This sentance conveys the idea that the geographical mile and the nautical or sea mile are regarded by the author as equivalent measures: and it is not remarkable, with the diversity of usage that has prevailed in books of reference, that the distinction between them should not be clearly present to the mind. The geographical mile is the one-sixtieth part of the length of a degree of the earth's equator, which, computed on the most perfect values for the size of the terrestrial spheroid, is 6087.15 feet. The nautical mile, as adopted by the navy department, is the one-sixtieth part of the length of a degree on the great circle of a sphere whose surface is equal in area to the surface of the earth. This value is 6080.27 feet, and corresponds to the English nautical mile, or "admiralty knot," which is 6080 feet.

The nautical mile has also been regarded as the mean length of a minute of latitude on the meridian, and again as the length of a minute of arc of the meridian corresponding to the radius of curvature of a particular latitude. The former, which according to the astronomer Bessel has a length of 6076.23 feet, is the nautical mile used in France, Germany and Austria. Computed on the Clark spheroid, which is adopted in the United States, the above value would be 6076.82 feet instead of 6076.23 feet.

Besides the geographical mile and the nautical mile, the word mile is used to name a great number of linear measures. There are the

Austrian post	mile, equivalent	to 24,000	English	feet.
Swedish mile,	"	36,000	"	"
Norwegian mile,	"	36,000	"	"
Netherlands mile,	"	3,281	"	"
Danish mile,	"	24,712.5	"	"
Prussian mile,	"	24,604.8	"	"
Roman mile,	"	4,854	"	"
German short mile,	"	20,576.2	"	"
German long mile,	"	30,375.8	"	"
Scotch mile,	"	5,950.6	"	"
Irish mile,	"	6,721.4	"	"
"Statute" mile,	"	5,280	"	"

The last mentioned is generally the measure referred to when the word mile is used in legal enactments (see sections 3,569 and 3,570 of the revised statutes of the United States). It has been adopted in the United States from a statute of the reign of Queen Elizabeth, in which the mile is defined as a length of 8 furlongs of 40 perches of 16½ feet each, or 5,280 feet. G. W. Littlehales.

Washington, D. C., Sept. 15, 1896.

Torpedo Boats.

Bids were opened at the navy department, Washington, Friday, for the construction of thirteen torpedo boats, three of which are to be of a 30-knot kind and ten of 20 knots. For the three fast boats $800,000 has been provided, while the total appropriation for the 20-knot boats is $500,000. The bids are complicated and will probably not be passed upon by the department experts for several days. Bidders on the 30-knot boats are: Union Iron Works, San Francisco; Bath Iron Works, Bath, Me.; Herreshoff Mfg. Co., Bristol, R. I.; John H. Dialogue & Son, Camden, N. J. On the 20-knot boats the bidders are: Columbian Iron Works, Baltimore, Md.; Moran Bros., Seattle, Wash.; Bath Iron Works, Bath, Me.; Herreshoff Mfg. Co., Bristol, R. I.; Wolf & Zwicker, Portland, Ore.; Providence Steam Engine Co.; Lewis Nixon, Elizabeth, N. J.; Charles Hillman Ship & Engine Building Co., Philadelphia, Pa.; Dialogue & Son, Camden, N. J.; Geo. Lawley & Son, South Boston, Mass.

For some time past we have found difficulty in obtaining good photographs of lake vessels when needed in the Review. We know that owners have also met with the same trouble. We have a photographer now engaged exclusively on this work. Order photographs from the Marine Review, 409 Perry-Payne building, Cleveland.

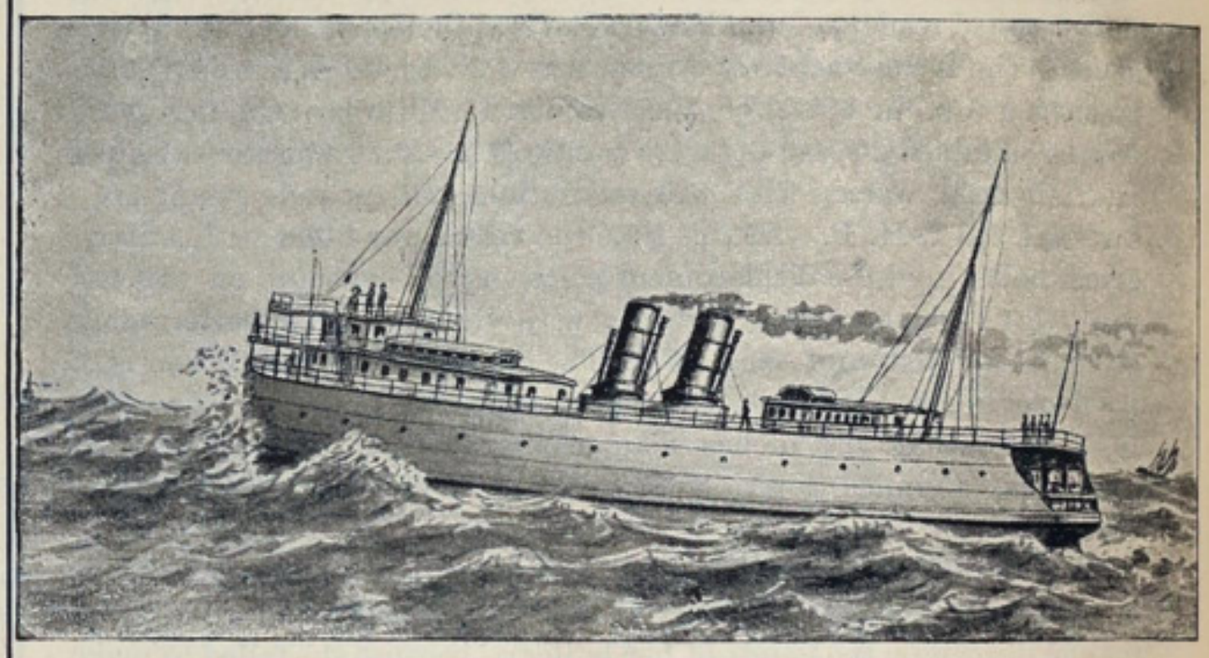
Cargo and Speed Records—Lake Freight Ships.

Iron ore—Coralia, Mutual Transportation Co. of Cleveland, 5,088 gross or 5,699 net tons, Gladstone to Ashtabula, draft of 16 feet 10 inches; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,569 tons gross or 5,117 net tons, Escanaba to South Chicago, draft of 18 feet. From Lake Superior—Steamer Sir Henry Bessemer, Bessemer Steamship Co. of Cleveland, 4,214 gross or 4,720 net tons, Duluth to Conneaut, draft of 14 feet 8 inches.

Grain—Steamer Queen City, A. B. Wolvin of Duluth, 207,000, bushels of corn, Chicago to Buffalo, 16 feet 8 inches draft; steamer Maricopa, Minnesota Steamship Co., Cleveland, 191,700 bushels of corn, Chicago to Buffalo. From Lake Superior—Steamer Queen City, A. B. Wolvin of Duluth, 157,000 bushels of wheat, equal to 4,710 net tons, Duluth to Buffalo, draft of 14 feet 8 inches.

Coal—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 54 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich., Buffalo to Duluth, 997 miles, 65 hours and 10 minutes, 15.3 miles an hour.



F. & P. M. RY. CO'S CAR FERRY PERE MARQUETTE.

Operating Steam Pumps Without Oil.

The torpedo boats, which are now being built in large numbers for the United States navy, are developing some features in machinery that are decidedly interesting to marine engineers. The design of engines is in most cases especially attractive. On the boats of this kind recently launched by the Herreshoff Mfg. Co., Bristol, R. I., the equipment of Blake steam pumps, as well as the main engines, will be run without the use of oil in the steam cylinders. While this is not a new idea, so far as vertical steam engines are concerned, it has never been the practice to run steam pumps without oil. The pumps furnished by the Blake company were arranged without any oil holes whatever, so that it is impossible to get oil into the steam cylinders. These pumps were given an exhaustive test for several days by the manufacturers and they operated with entire satisfaction, and without using a drop of oil. The doing away with the use of oil in the steam cylinders of a vessel is a matter of considerable importance, as there is no necessity of carrying feed water filters and no anxiety about oil injuring the boilers.

Pleased with the Review.

A leading marine engineer of New York, who represents a concern that carries an important line of advertising in marine journals, says in a letter to the Review: "I don't wish you to print what I am about to say, because I don't want the ill-will of the other marine papers, which would be a distinct injury to me, but I get more interesting and important news out of your paper, and in a more attractive form, than out of any other paper that comes into my office, and I subscribe to a lot of them."

Another authority on ship building matters, Wm. A. Fairburn of Bath, Me., says: "Your paper still keeps up to the high standard it set two years ago, and I enjoy reading its broad, unprejudiced columns."

Ship Yard Matters.

The Bessemer Steamship Co. has made a settlement with the Globe Iron Works Co. in the matter of demurrage due on account of delay in delivering the first of the ships built for Mr. Rockefeller. It is understood that the settlement was quite satisfactory to both interests, and that differences regading the second boat will be based on this first settlement. All of the ship builders who had Rockefeller contracts, excepting the American Steel Barge Co., will have differences of this kind to settle with the Bessemer Co. The West Superior concern was a few days ahead in getting out the two boats for which they had contracts, but Wheeler & Co. and the Detroit Dry Dock Co. are already considerably behind, and the Cleveland Ship Building Co. will be about three weeks late on the boat which they launched on Wednesday of this week. It is understood that the Detroit Dry Dock Co , instead of paying a stated amont of demurrage per day, is to pay 10 per cent. interest for all time after date fixed for completion of vessels on all money advanced for their construction.

No effort will be made to launch any of the wooden vessels which Capt. James Davidson has on the stocks at West Bay City until about Nov. 1, as it is not intended to have any of them go into commission this season. There are three boats—a steamer and two large tugs, all being built on yard account. Another tug, built for B. B. Inman of Duluth, and which was launched a few days ago, will go into commission as soon as possible. Capt. Davidson has a large amount of timber on hand, but he says now that the great change in business conditions is causing him to hesitate about putting down any more keels. The steamer that is to hold over until next season is 280 feet over all, 43½ feet beam, and 26 feet moulded depth. She will have triple expansion engines 16, 25 and 42 by 34 inches. Her boilers will be fitted with the Howden system of draft.

Losses that are now furnishing big dry dock jobs at Detroit will prove more costly to the underwriters than was at first expected. The Lake Superior Iron Co.'s steel steamer Wawatam, which struck above the Sault, will be in dock for fully three weeks with a force of probably 150 men at work on her. She has twenty-nine plates and eighty frames and floors to come off, and sixteen of the plates must be replaced by new ones. This will probably prove the largest single loss of the season, as the cost of repairs may run above $25,000. Repairs on the wooden steamer Oceanica, sunk by collision with the Chisholm, will also prove very heavy, as the survey, based on a value of $65,000, is said to prove a total loss from an insurance standpoint. Both of these vessels are insured in England.

Two more of the Rockefeller steamers were launched on Wednesday of this week, the James Watt by the Cleveland Ship Building Co. and the George Stevenson by F. W. Wheeler & Co. of West Bay City. The first of these boats is fully described in the Review of June 4 and the other in our issue of June 18.

Mr. I. G. Sowter, designer of marine engines, who has been employed with the Cleveland Ship Building Co. for some time past, has re-entered the employ of S. F. Hodge & Co., Detroit, where he takes the place made vacant by the resignation of Henry Penton, who went to the Chicago Ship Building Co.

Tonnage of the new Union line steamer Ramapo, built by the Union Dry Dock Co., Buffalo, is 3,045.03 gross and 2,434,91 net. Her official number is 111,123.

There is absolutely nothing new to be said of the lake freight situation. Notwithstanding the great number of boats that have gone into ordinary, grain freights show no indication of improvement, and there is little, if any, hope of profitable carrying charges on grain, even during October and November. Nobody expects any change this year in the conditions that have shut off everything excepting contracts in the ore business. Such of the ore companies as have not already laid up some of their vessels are working all sorts of deals to keep in commission until November the boats which they now have in operation. In the office of Mitchell & Co., Cleveland vessel agents, it was announced to-day (Thursday) that they have, among the fleets which they represent, twenty-seven vessels laid up, while Mr. M. A. Bradley says that with the close of the present week every one of his big line of boats will be out of commission.

Order photographs of vessels, best quality, to be taken on Detroit river, from the Marine Review.

Aids to Navigation—Shoals, Buoys, etc.

Another water gauge that will prove of assistance to deep-laden vessels bound up the Detroit river has been established on Shipman's coal dock at Amherstburg. Mr. Walsh, who is in charge of the Shipman dock, says in a letter to Capt. Geo. P. McKay: "With the assistance of Mr. Dixon, the engineer who is looking after government work on the river, I have placed in position the water gauge that was spoken of when you were last at Amherstburg. This guage will show, at all times, the depth of water over Ballard's reef and the Lime-Kilns crossing. Captains can at all times learn of the stage of water by passing a little closer to our dock than they do ordinarily. If they blow us a special signal, say two long and two short blasts, we will give them attention, and if they find the stage of water too low to pass up, we will try to make it convenient for them to await better water. The gauge has been erected on the south end of the dock, so as to give the captains an opportunity to stop before they get too far up."

Deep-laden vessels are finding shoal spots in deep parts of the Detroit river and in other channels where it was thought there was great depth of water. Capt. Greenley of the steel steamer Roman reports that he touched lightly about 1,000 feet above Ballard's reef light-ship when drawing 16 feet 8½ inches. The water was about 8 inches lower than usual at the time. He had Duff & Gatfield's ranges a little open to the westward. It was supposed that there was full 30 feet of water on this reach, but in confirmation of Capt. Greenley's report, Capt. John Lowe says that when in the steamer Kaliyuga last season he struck a little below the red stake at the foot of Fighting island on the same reach.

Capt. F. A. Fick of the steamer Fedora reports that while passing down the Sault river on Saturday last he struck a shoal a short distance west southwest of the intersection of the Sailors' Encampment light and the Point of Woods light. Capt. Fick says he was at anchor east of the course waiting for the propeller Sparta and tow to pass up and when he signaled his engineer to go ahead the vessel would not move. She was hard on forward. The chart shows 30 feet of water in the channel and vicinity. Capt. Fick is inclined to the belief that dredges at work in the cut have dumped boulders in the channel, and that it was upon these his vessel rested.

Capt. Walsh of the steamer Corsica, another vessel that has been loading to about 16 feet 8 inches, reports that he touched lightly opposite Atkinson's dock on Bois Blanc island, Detroit river. It is known that there is a spot at this point, near the head of Bois Blanc island, with little more than 17 feet on it, but this shoal is close to the island and Capt. Walsh claims he was in the middle of the channel.

Although they are a long time coming, it is quite probable that the gas buoys for Pelee passage will be in position and lighted before the worst of the fall weather sets in. The buoys are at Amherstburg and are understood to be in readiness to be moved to their stations. The southeast shoal buoy is painted red, while the one for the middle ground is black with the words "middle ground" in red letters.

Upon returning from a trip around the lakes on several lake vesesls, Commander Sigsbee, who is in charge of the hydrographic office at Washington, appended this note to a letter which he wrote thanking Cleveland vessel owners for courtesies extended to him: "You might say to Capt. W. C. Richardon that I took full note of what he said about the Christian character of Capt. Thomas Jones, and was therefore much interested in the seamanlike way in which "Capt. Tommy" cussed his way up through the Detroit river during the mid-watch that I spent on deck with him one very pleasant night."

All are invited to join the excursion to Jamestown on Chautauqua lake, via the Nickel Plate road, Saturday, Sept. 26th, the event being a Scandinavian Republican Celebration. Appropriate speeches. Trolly car and boat excursions. Special train leaves Broadway depot at 5:30 a. m. $2.75 for the round trip. 341 Sept. 25.

Col. Jared A. Smith, United States engineer in charge of the Cleveland district, is supported by the war department in ruling that the county bridge at Ashtabula Harbor is an obstruction to navigtion. The county officials are endeavoring, in every way possible, to avoid rebuilding the bridge, but it is probable that they will be forced to do so.

MARINE REVIEW

DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

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Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1895, contained the names of the 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598,72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

	Number.	Gross Tonnage.
Steam vessels	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged	487	83,081.91
Total	3,342	1,241,459.14

The gross registered tonnage of the vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891	204	111,856.45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
Total	347	335,433,98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (*From Official Reports of Canal Officers.*)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about ½ per cent. of the whole, but largely in American vessels.

It would seem that the experience of the City of Duluth in the matter of taxing vessel property is worthy of consideration from boards of equalization and other officials in leading lake cities that have to do with the question of taxes. About two years ago the legislature of Minnesota passed an act of a special kind assessing a tax on vessel property much lower than is charged in some other lake states. On July 1, 1895, there were fifty-eight vessels enrolled with the Duluth collector of customs, and these were nearly all tugs and other small craft, the total tonnage being only 5,485.04 gross. But on July 1, 1896, one year later, the records at the Duluth custom house showed, as a result of the low tax referred to, an enrollment of eighty vessels with a total tonnage of 26,078.73 gross, an increase of nearly 500 per cent. This amount was nearly doubled during July and August, and on Sept. 1, 1895, 51,184.85 tons gross, or 41,786.30 tons net, was enrolled. Now what is the meaning of this increase in enrollment and consequent additional revenue at Duluth? It is plain that many vessel owners avoided enrollment at other points on the lakes, and where it was at all convenient for them to do so they took up enrollment at Duluth in order to obtain the advantages of low taxes. But it may be said that the Duluth rate was too low and that the question of raising it is now being agitated. This may be true enuogh, but the fact remains, as we have often claimed, that the lake states enforcing high taxes on vessels are following a poor policy, and the county, city or town officials who follow up the this policy with an extreme enforcement of the law are also standing in their own light.

It is said that one of the chief merits of a passenger agent, whether connected with a railway or steamship line, is his ability to exaggerate matters in a graceful, artistic manner. This is prompted by a statement, printed last week in the Review as well as in other lake papers, regarding the number of passengers carried during the season just closed by the Northern line passenger steamer North Land. It was said that this boat carried, during the past season, 1,600 more passengers than was carried by both boats in 1895. It is quite generally understood that these big steamers, especially the North Land, were very successful during the past season, but a few figures based on the statement just referred to would indicate that some of the claims as to the number of passengers carried are a little overdrawn. At the close of 1895 it was learned from very good authority that the two boats carried a little less than 17,000 passengers. For convenience sake, let us place the number at even 17,000 and we will have the North Land carrying during the past season 17,000 plus 1,600 or 18,600 passengers. This would be an average of 1,430 passengers per trip, as she made thirteen trips. But everybody knows that on the first three trips in the spring and the last two in the fall the passenger list of the North Land could not have exceeded an average of 500 per trip. This would leave 16,100 passengers to be carried on eight trips during the busy season, or an average of 2,012 per trip. Evidently the merits of the desirable passenger agent are shown in these figures.

In less than seven days, counting with the sun, American travelers can now make the trip from Southampton to Cleveland, crossing the Atlantic on an American ship and coming west from New York on two railway lines that are among the finest in the world. Mr. J. W. Walton of the Upson-Walton Co., Cleveland, did this recently, and might have beaten the seven day period by five hours if he had not remained over a few hours in New York. His passage from Southampton to New York was on one of the American line ships and from New York west he took the New York Central and Lake Shore roads. He says that one of the Cramps had the ear of Li Hung Chang during the entire voyage, evidently talking for war-ship contracts, but it would seem that the American builders have as yet made little headway in this regard with either China or Japan. Li Hung Chang is undestood to have left one order in Germany for a war vessel, and the patronage accorded English builders by Japanese concerns having merchant vessels to build is quite important. There are at present ten large steel twin-screw steamers being built in England for general trade between Japan and London. The owners are the Nippon Yusen Kaisha of Japan. Each of these vessels is to carry over 7,000 tons deadweight and to steam over 12 knots. Three are being built by Napier, Shanks & Bell, five by D. & W. Henderson & Co., and two by Workman, Clarke & Co.

If vessel men of Detroit are of the opinion that the shoal in the Detroit river at the foot of Wayne street, on which the Western line steamer Hudson grounded a few days ago, was formed by deposits from city sewers, they will find a certain means of redress from further difficulty of this kind by bringing the matter to the attention of the war department. A river and harbor act of a few years ago gives to the secretary of war as much authority in the matter of obstructions caused by sewers entering into the Detroit river, or any other highway of commerce, as he has regarding the building of bridges that would obstruct such waterways. All that is necessary is to make complaint through the United States engineer in charge of the district and have him proceed with an investigation.

The feeling of real sorrow that attended meetings in Cleveland last week to take action on the death of William S. Mack and H. J. Webb has resulted in an effort to secure memorials for the families of these vessel men that will be elegant specimens of their kind. A pen and ink artist who has shown rare genius in his work has been engaged to inscribe these memorials and to adorn them with portraits of the deceased surrounded by anchors, old style capstans, etc. The list of prominent vessel men who have died since the last meeting of the Lake Carriers' Association in Detroit in January last is unusually large. Aomng them may be mentioned Capt. John Rice of Buffalo, Capt. E. M. Peck of Detroit, Conrad Starke and Capt. John Fitzgerald of Milwaukee, Thomas Quayle, Capt. W. B. Guyles, H. J. Webb and Capt. W. S. Mack of Cleveland.

It will probably develop before long that there is more in the experiment with the Grummond passenger steamer now running between Detroit and Cleveland than appears on the surface. Certain well-known steamboat men on the lakes have for some time past been giving careful attention to the details of day service between Detroit and Cleveland with first-class, high-powered ships, and in this connection they are considering also the possibilities of building up a passenger business by lake between Buffalo and Detroit.

Notwithstanding all that has been said in newspapers around the lakes about the sale of the fast river steamer Unique to representatives of the revolutionary party in Cuba, the Review has a letter from Mr. C. McElroy of St. Clair, Mich., managing owner of the Unique, in which he says the steamer has not been sold. He says nothing further regarding the boat's future but it is very probable that she will be found running again next season between Detroit and Port Huron.

Plenty of Steam with any Kind of Fuel.

Following is an extract from a letter received recently by the Detroit Dry Dock Co. from James D. Stewart, chief engineer of the Bradley steamer R. P. Ranney:

"Permit me to exprpss to you my satisfaction with our new boiler, and the Howden hot draft as applied by your company. We make a trip on 150 tons of fuel, for which we pay $1.75 per ton, and we always have all the steam we want. It has made a difference of thirty-five to fifty tons of fuel on a trip, and a difference of thirty-five cents per ton in cost in favor of the fuel we are now enabled to burn. I can take any kind of fuel and any kind of firemen, and always have steam. In fact, the only trouble I have is to condense it as fast as I make it. We have nut coal this trip, at $1.90 per ton, and we are pulling the whaleback barge No. 117 a trifle over eight miles an hour, with a fuel consumption of about 1,600 to 1,700 pounds per hour, whereas, with the old boiler, we would burn 2,200 pounds per hour for about the same speed, and without the tow. One great satisfaction is that when you want steam you can get it, no matter how hard you are working the engine. We met with the necessity of working the engine very hard the other day, and we run her wide open, but had no trouble whatever in getting all the steam we wanted, and I assure you it is a pleasure to be able to do that. I have no trouble at all chasing firemen. Can take any kind of a man and can make all the steam that I want, under all conditions, and with any kind of fuel."

Telltale Boards for Signal Lights.

The life of the mariner and the safety of his ship in the night depend in large measures on the continuous burning of the ship's lights during fixed periods between sunset and sunrise. Government regulations and underwriters' rules have long been framed to govern this. In the case of oil lamps, one of the watch keeps a vigilant eye on the lights, but with the introduction on shipboard of electric lamps, in which the life of the filament is uncertain, a means is necessary to show whether the lamps are burning, which can be referred to at any moment with the assurance of an exact indication. The General Electric Co. has given more attention to the adaptation of electricity to shipboard use than any other electrical concern, since Edison put in the first incandescent lighting plant on the old Pacific steamer Columbia to the present day, and for the purpose above mentioned has devised an indicator which is very simple and reliable. This telltale is placed in a convenient place, generally in the pilot house, and the main wires supplying current for the running light are brought to the two lower binding posts, positive and negative. From the two upper binding posts wires lead directly to the lantern. A lamp is inserted in the receptacle at the top of the board. Should the lamp in the lantern go out, while current is in the main wire, the lamp on the board will light up, and the buzzer in the center will ring. The snap switch at the bottom of the board cuts all current from both the board and

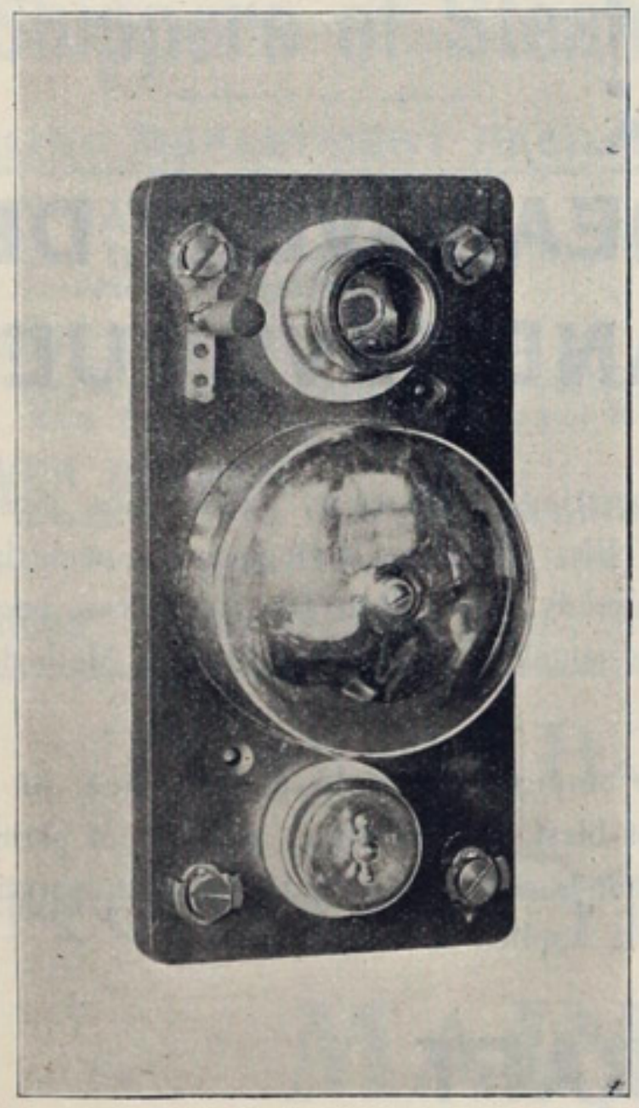


FIGURE 1.

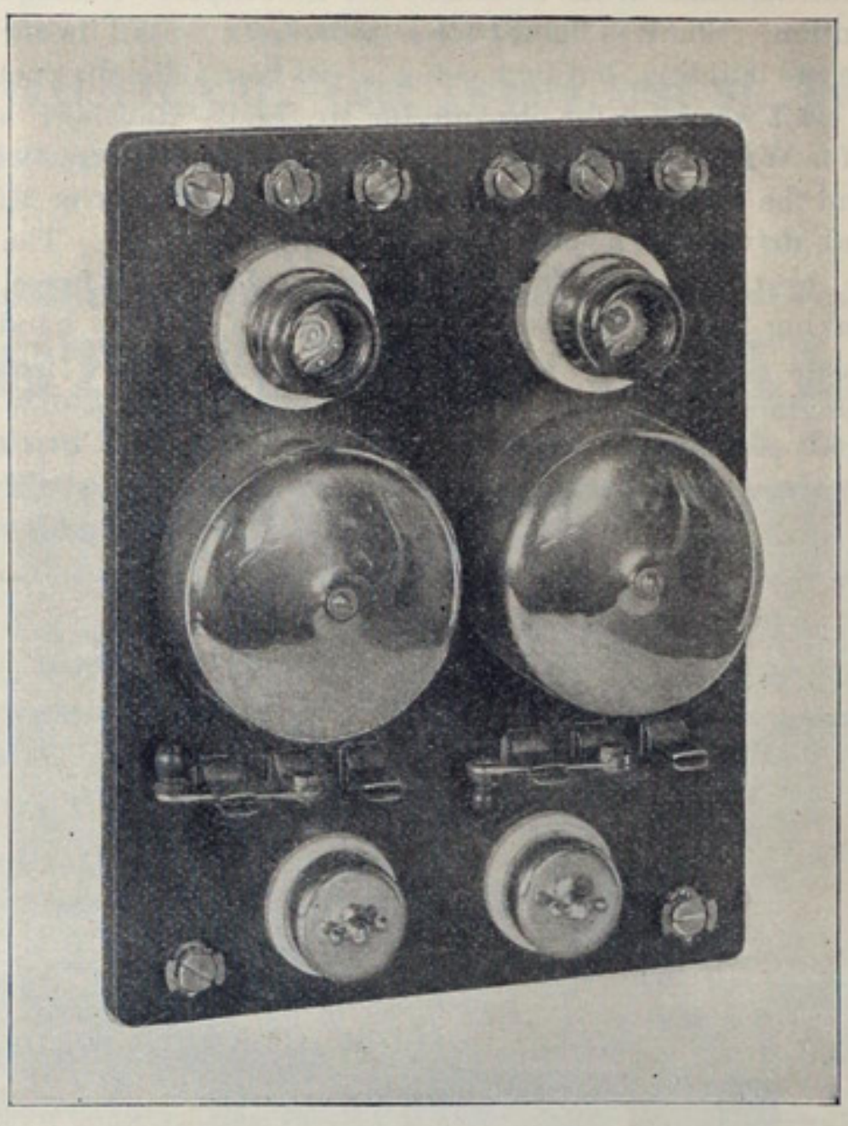


FIGURE 2.

running light To test the indicator, the plug at the upper left hand binding post is removed, when, if the apparatus is in working order and the current on, the indicator lamp will burn and the buzzer ring, while upon insertion of the plug again the running lamp will light up.

Fig. 1 shows a telltale board for one lamp in one lantern, but a full set of indicators can be grouped on one board. Fig. 2 shows a modified form for two lamps in each of two lanterns. Should one lamp be extinguished the current can be immediately thrown into the second lamp by throwing the small knife switch at the bottom of the board over to the other clip. If the blade is not in contact with either clip, the indicator lamp will burn and the buzzer ring.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Sept. 19, 1896:

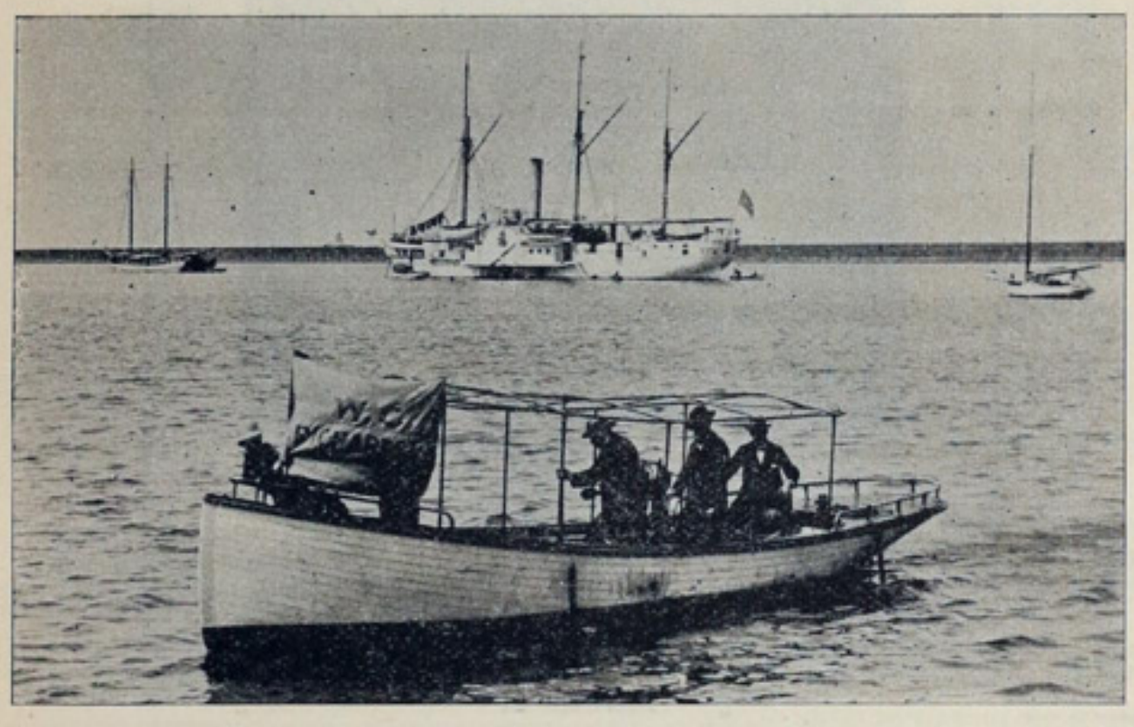
	Wheat, bushels.	Corn, bushels.
Chicago	13,219,000	4,280,000
Duluth	5,905,000	19,000
Milwaukee	430,000	3,000
Detroit	485,000	11,000
Toledo	711,000	30,000
Buffalo	2,237,000	752,000
Total	22,987,000	5,095,000

As compared with a week ago, the above figures show at the several points named an increase of 964,000 bushels of wheat, and 228,000 bushels of corn.

Piles were being driven in one of the new buildings for a foundation for a punch. They were eight inches in diameter and 14 feet long. The staging was bamboo, and so was the frame for the hammer, which was a round piece of cast iron, with a hole in the center for a guide-rod. Attached to the hammer block were twenty-seven ropes, carried up to the top of the frame and down on the outside, looking very much like the old-fashioned Maypole. Twenty-seven women had hold of the ends, and with a sing-song, all together, pulled down; up the rod, 4 feet, traveled the hammer; then, at a scream, all let go, and down it came on top the pile, which was unprotected by a band or ring. The women were paid 20 cents in gold per day. This May-pole driver is in general use throughout Japan and China.—Cassier's Magazine.

The W. C. Richardson.

With all the comment on ship building prospects and reports of launches,a new boat has been running around Cleveland harbor without attention of any kind from the newspapers. When contracted for, when launched, and when she made her trial trip, she managed to escape mention. She was named for a prominent vessel owner in the Perry-Payne building, but he has not as yet been officially notified of it. The craft was built for pleasure for Mr. Louis Hausheer and was named for W. C. Richardson. The hull is 32 feet long by 6½ feet beam, and the Wootters gas engine, built by the McMyler Mfg. Co., Cleveland, drives it at a speed of about 9 miles an hour. The cylinder is 6¼ by 12 inches. This little engine develops 7 horse power when making 290 revolutions. The Lotta, one of the handiest delivery boats on the lakes, has a similar engine. Some twenty stationary engines of the same type are also giving satisfaction in running printing presses, etc. One or two turns of the fly wheel is all that is required to start this engine. The engine shaft is independent of the propeller shaft, so that it is not necessary to stop the engine when the propeller wheel is stopped. The engine shaft is connected direct to the propeller shaft for forward running , by means of a friction clutch coupling, which is simple, effective and reliable. To reverse, the friction clutch is thrown out and reversing is done by means of bevel frictions, this being a noiseless and simple arrangement. Reversible propeller wheels can be furnished if desired, doing away with all reversing apparatus.



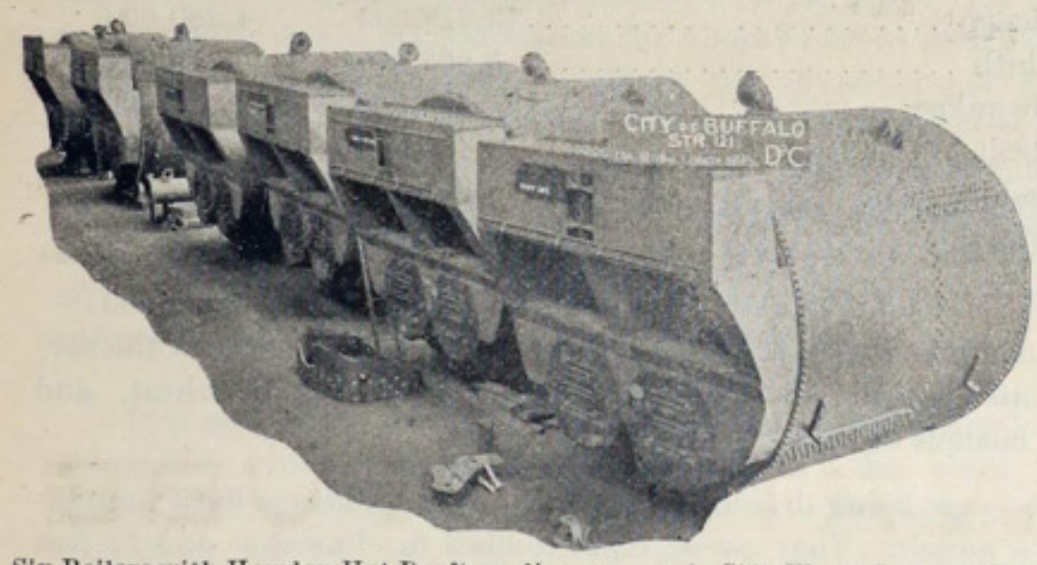
A. M. SMITH, MEMBER OF THE SHIP BUILDING FIRM OF ABRAM SMITH & SON, ALGONAC, MICH.

In the contracts for the three 11,000-ton battleships that are to be built, one each by the Cramps of Philadelphia, Newport News Ship Building & Dry Dock Co., and the Union Iron Works of San Francisco, no premiums are offered for increased speed, but a penalty at the rate of $25,000 a quarter knot, is imposed for the first half knot below the maximum requirement of 16 knots. It is proposed to name these ships California, Alabama and Pennsylvania.

Hunters' excursion rates are offered by the Nickel Plate road to points in Michigan, Wisconsin and the southwest. 339 Nov. 1.

Air is Cheap—Cheaper than Dirt!

FUEL IS DEAR—VERY DEAR!
USE AIR AND SAVE FUEL!



Six Boilers with Howden Hot Draft appliances now in Side-Weeel Steamer City of Buffalo. Dimensions of each boiler—12 ft. 6 in. diameter by 12 ft. length.

ECONOMY in operating expenses on Lake Ships must come from reduced coal bills. No great saving can be made in labor cost, and provisions are already low. But fuel bills can be lowered and cheap coal used to advantage by adopting Modern Methods of making steam at low cost.

No manufacturer of pig iron would to-day think of running his furnace without a hot blast. Competition would not permit it. This same competition demands advanced practice in the operation of ships. The same principle is applied in the

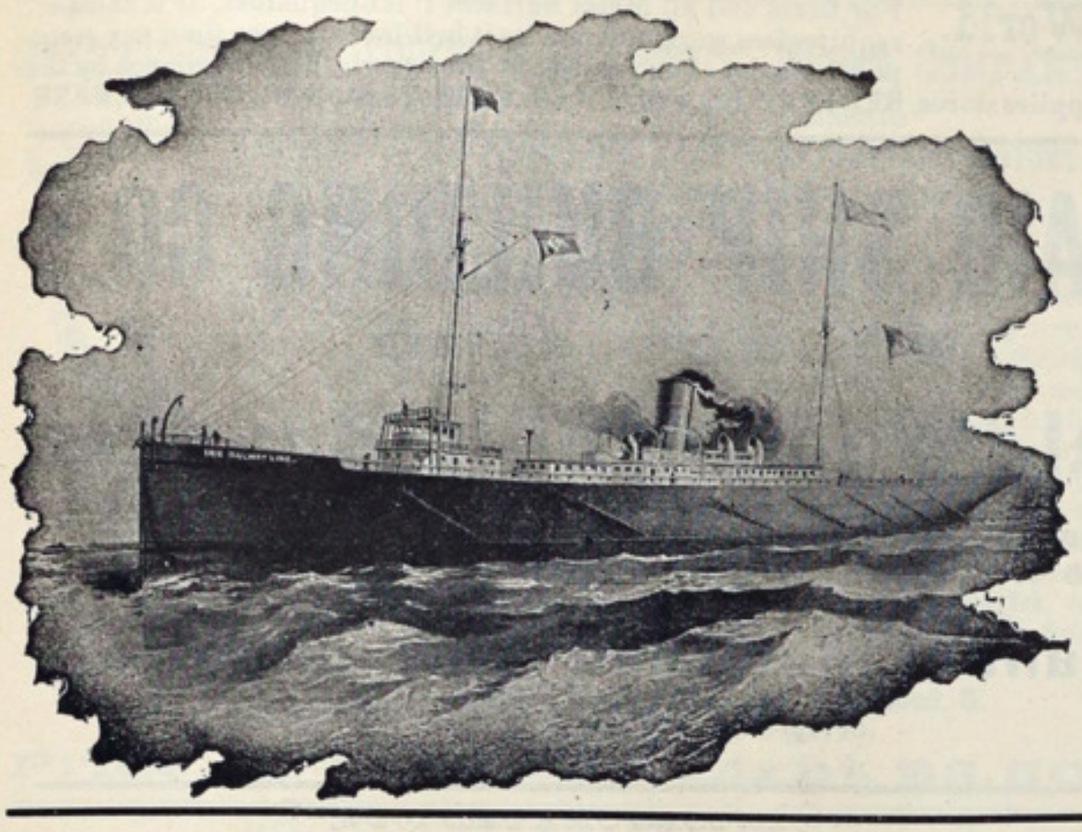
HOWDEN HOT DRAFT

Now in use on Lake Steamers aggregating over 40,000 Horse Power.

CAN BE APPLIED TO OLD SHIPS AS WELL AS NEW ONES.

No complicated machinery. Cool engine rooms and cool fire holds. Estimates readily furnished for application of this draft to any steamer

DRY DOCK ENGINE WORKS, DETROIT, MICH.



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DETROIT RIVER.

JAMES GRAHAM, Foot Twenty-first St., Detroit,

Below Routes of Passenger and Car-Ferry Lines.

Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL.

Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

Keeping a sharp look-out for Shipman's Koal Dock.

GIVE US a chance to prove that we can coal your boats with quick dispatch, and with most satisfactory fuel.

We have Four Large CHUTES on our Docks at AMHERSTBURG, ONTARIO, 1,000 FEET RIVER FRONT and Day and Night Force.

OUR STOCK CONSISTS OF

"Keystone" Massillon, Youghiogheny, and Best Grades of Hocking Koals.

O. W. SHIPMAN, MAIN OFFICE, 90 Griswold St., Detroit, Mich.

Cuddy-Mullen Coal Co.

Lake Shippers of Steam Coal.

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—
Car Dumper; Eight Pockets; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—
Amherstburg, Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

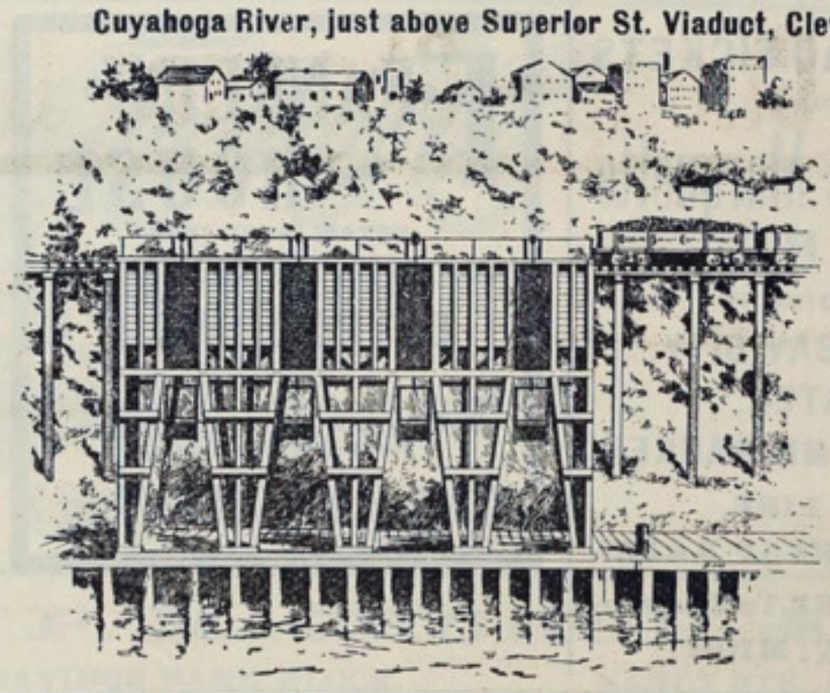
SAULT RIVER BRANCH—
Pocket Dock now under construction.

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

FUEL DOCKS OF OSBORNE, SAEGER & CO.

Cuyahoga River, just above Superior St. Viaduct, Cleveland, O.



Best Youghiogheny Steam Coal Furnished Day or Night. No delay as Elevated Pockets are used.

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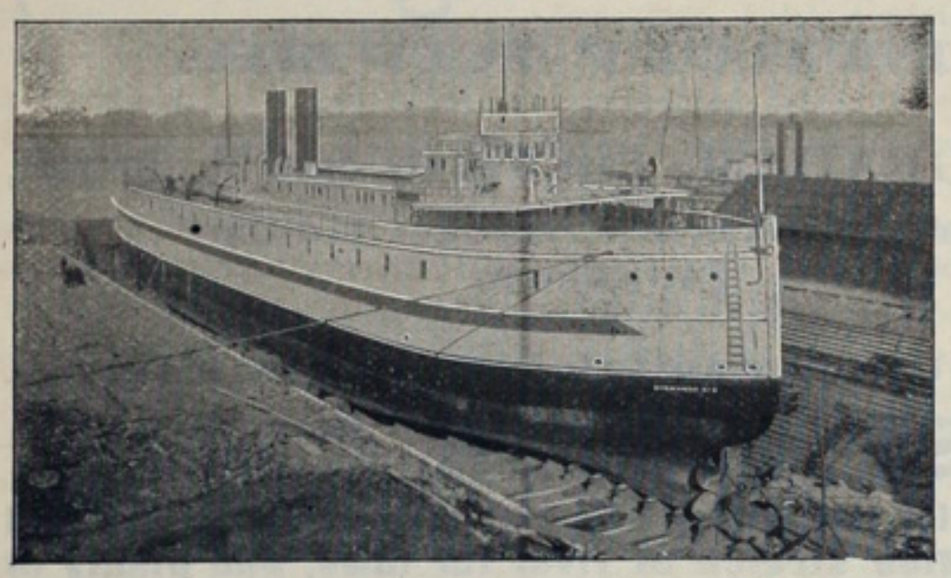
FORGED STEEL WATER-TUBE MARINE BOILER,

29 CORTLANDT ST., NEW YORK.

Boilers sold to United States Merchant Marine and Yachts	16,500 H. P.
Boilers sold to United States Navy	7,500 "
The only Water-tube Boiler in the British Merchant Marine	15,500 "

Bertram's Oil Polish. The Marine Polish of the World.

For Brass and all Metal Surfaces it is unequalled. It is cheape , requires less work and retains it brilliancy longer than any meta. polish made. Acknowledged the standard of excellance by the U.S. government in the marine departments. For sale by ship chandlers and engineers supplies stores. BERTRAM OIL POLISH CO.,220 & 22 State St.,BOSTON,MASS.



Shenango No. 2, 300 feet long, 54 feet beam.

CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,

Metal and Wooden Ship Builders.

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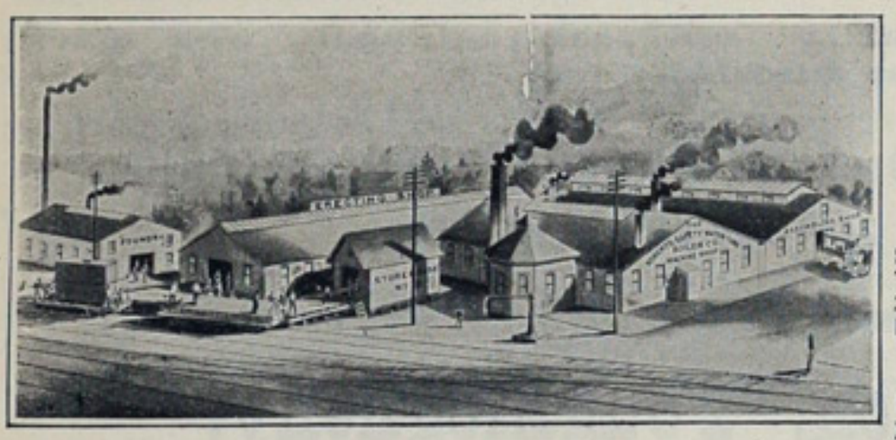

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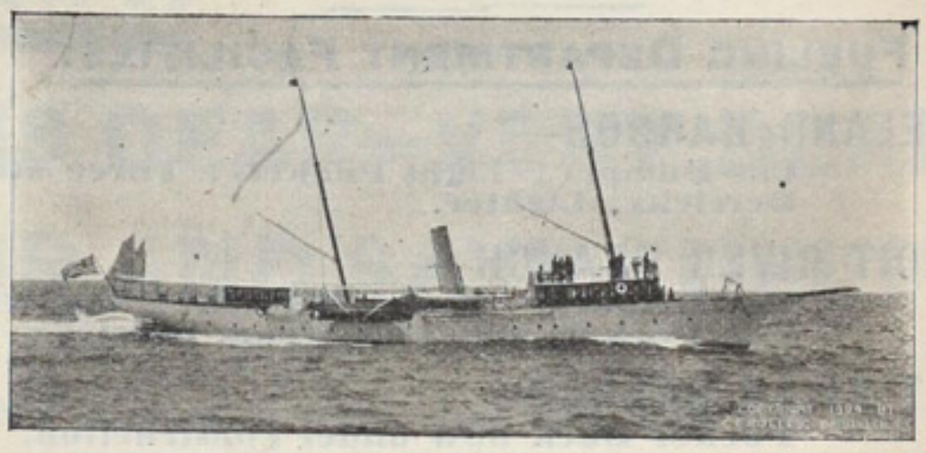

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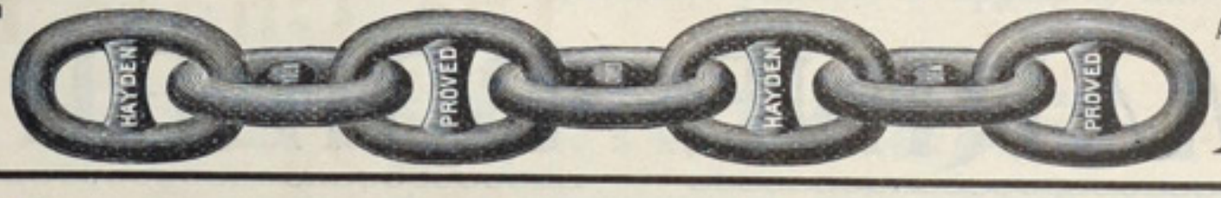

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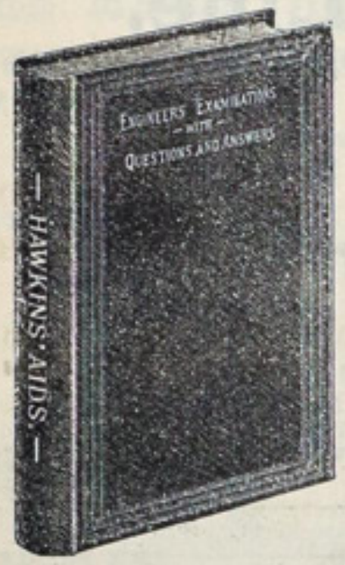

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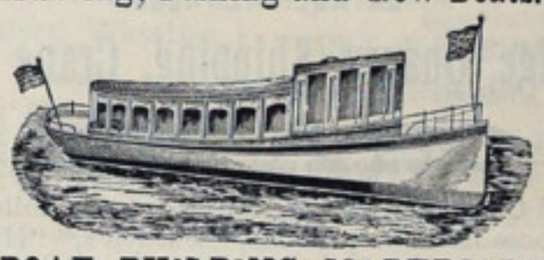

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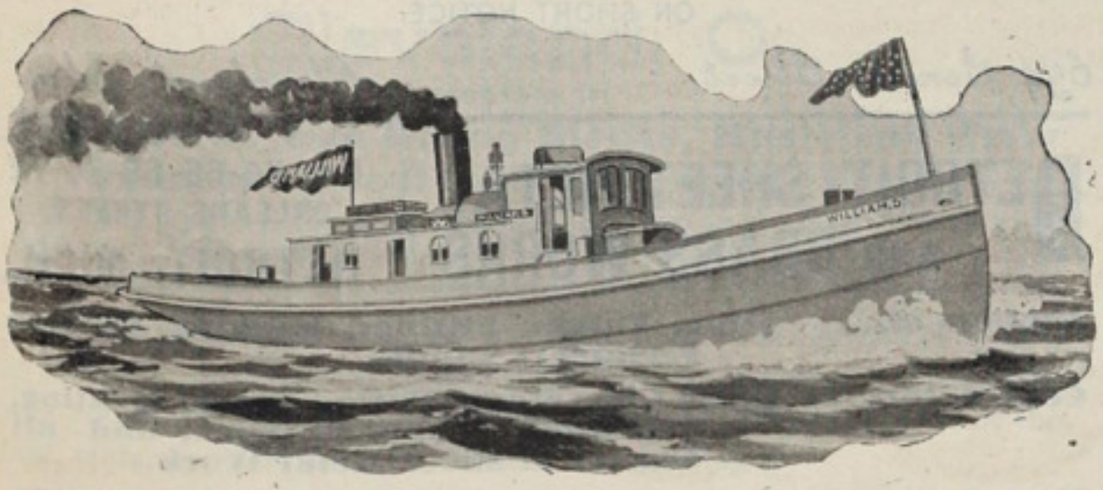

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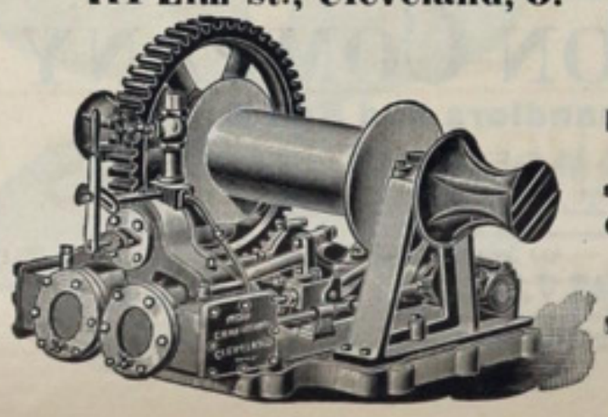

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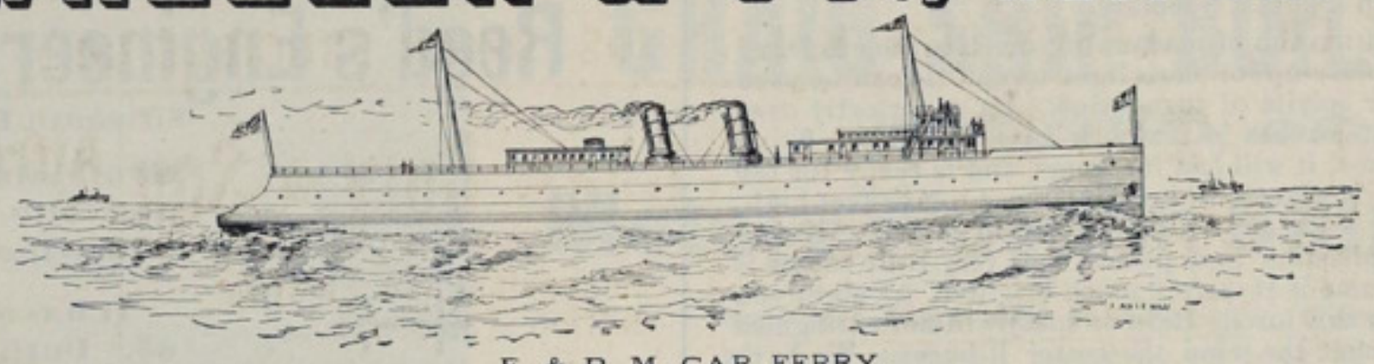

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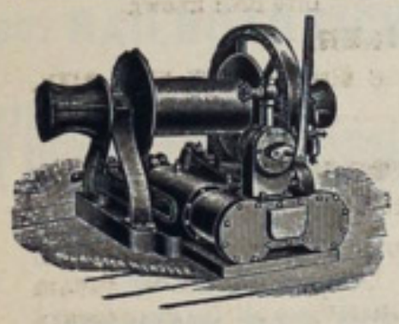

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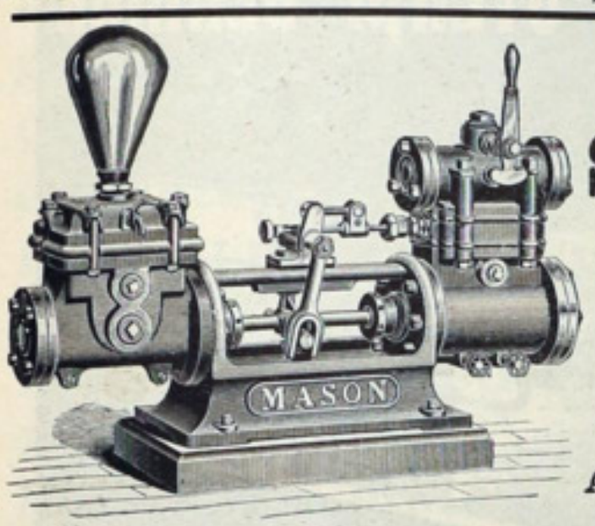

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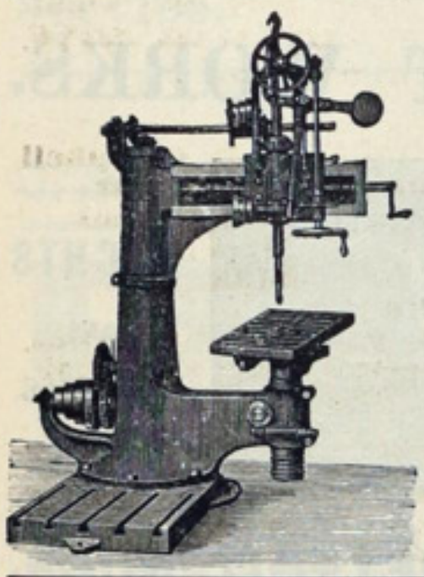

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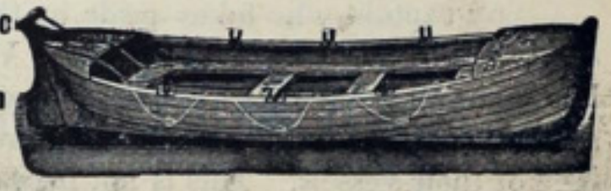

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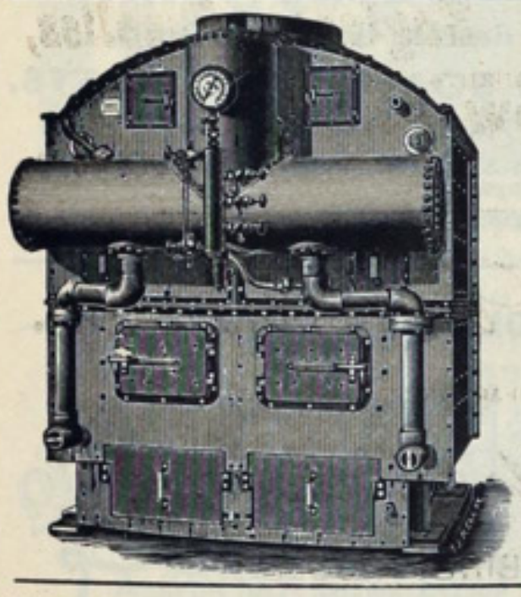

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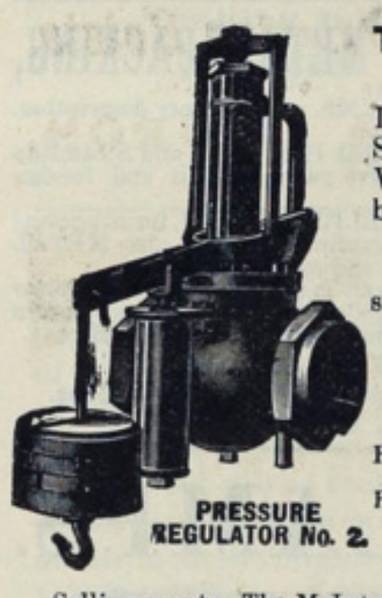

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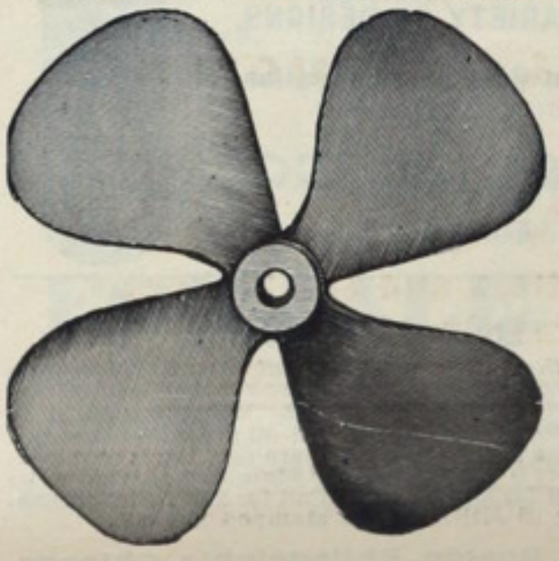

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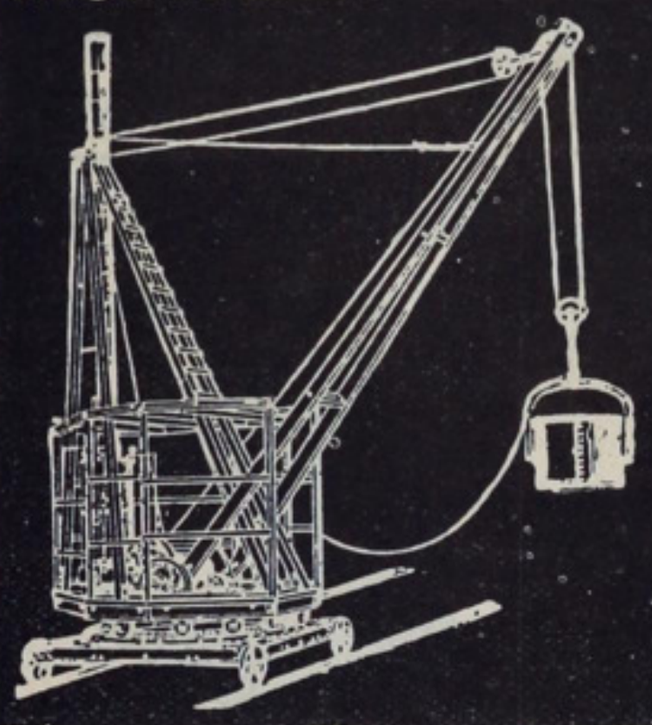

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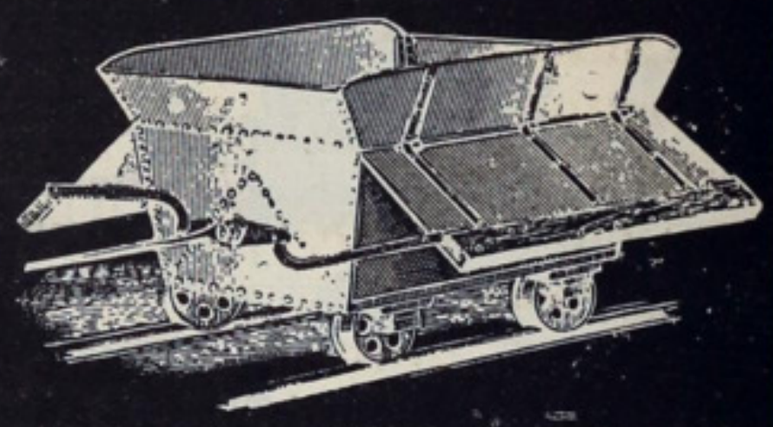

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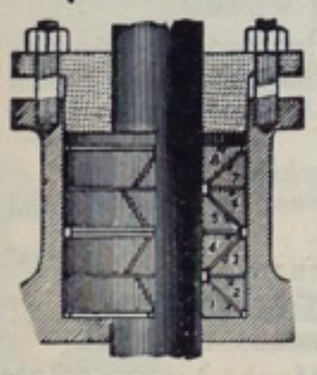

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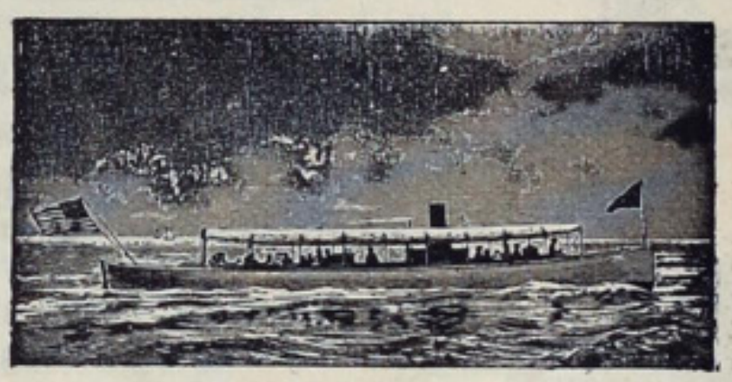

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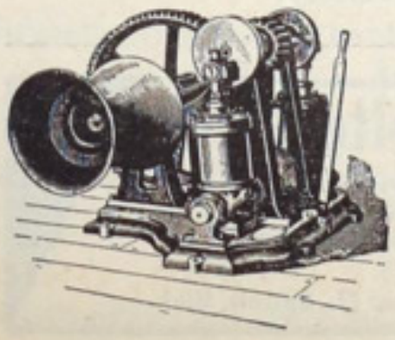

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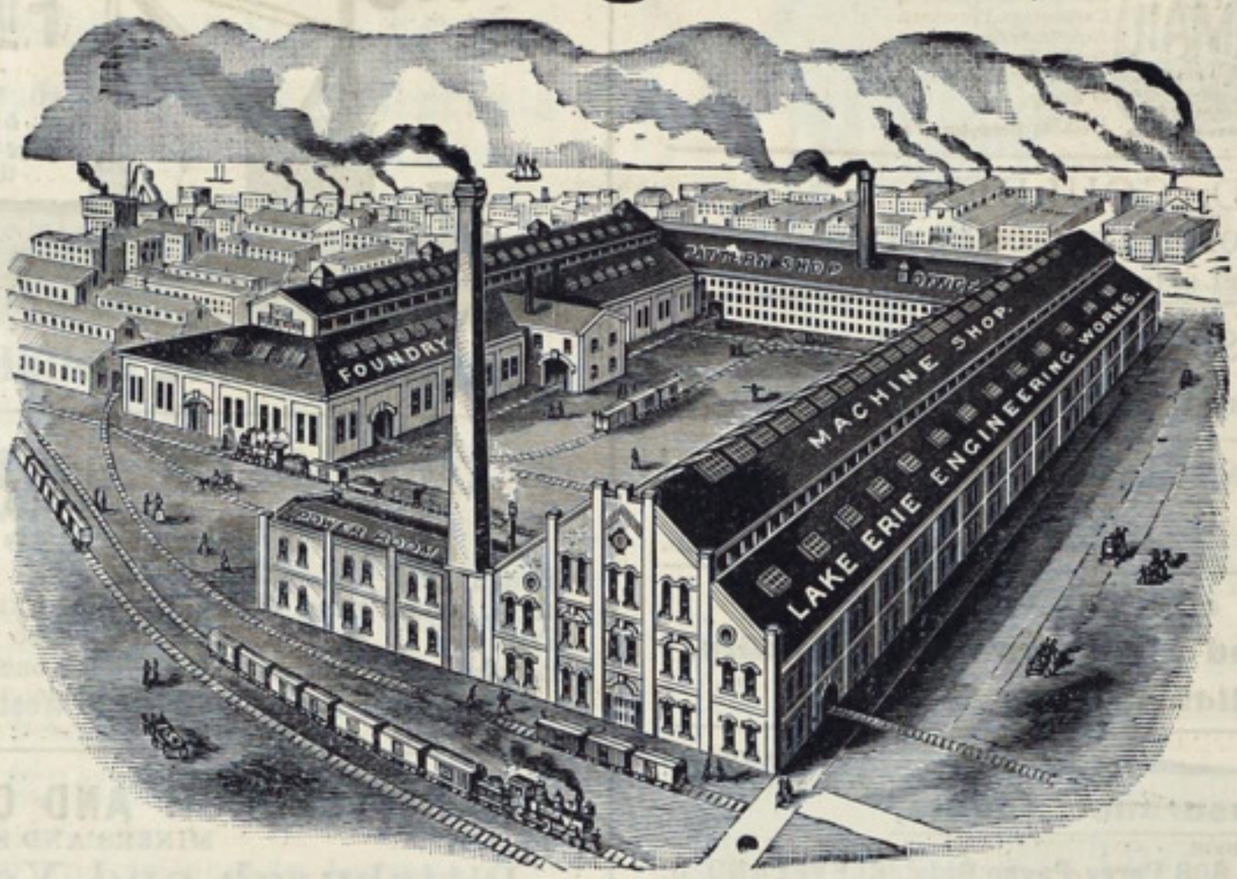

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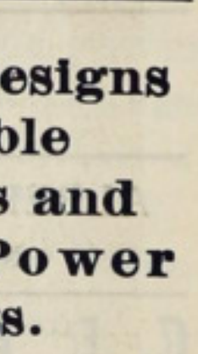

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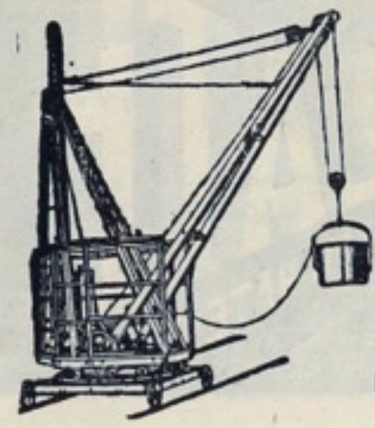

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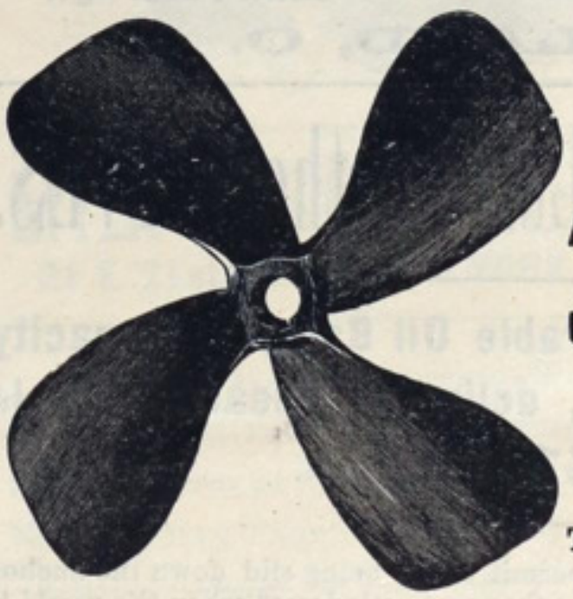

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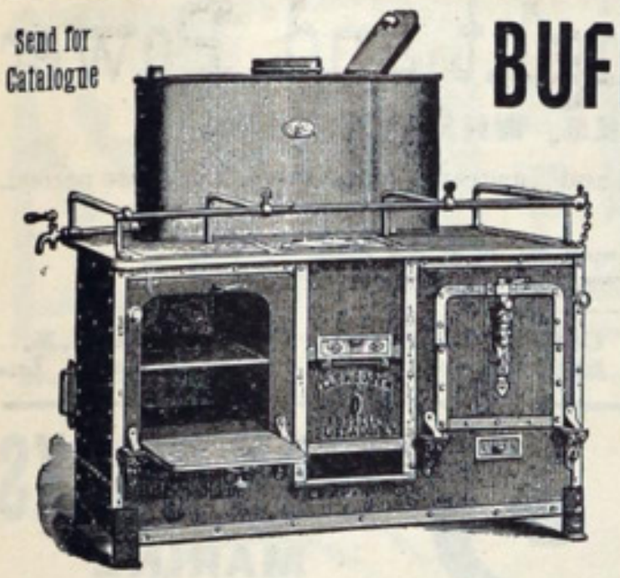

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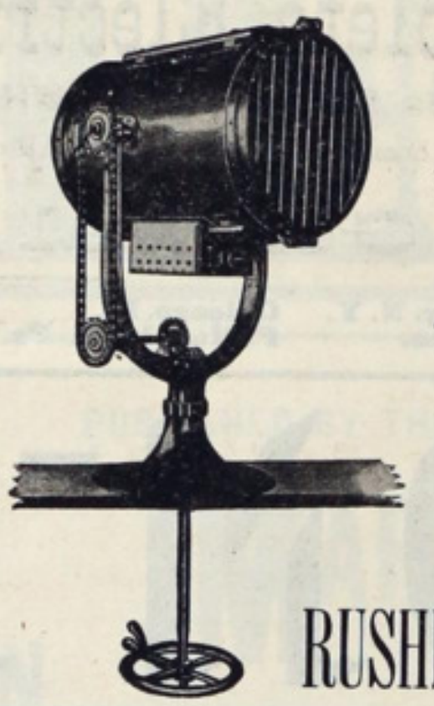

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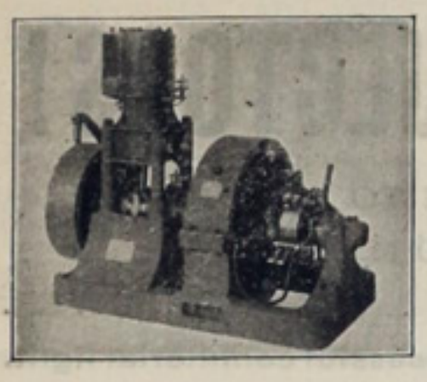

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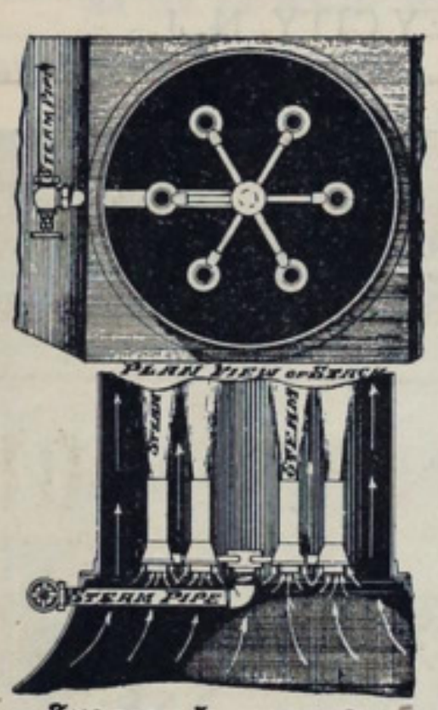

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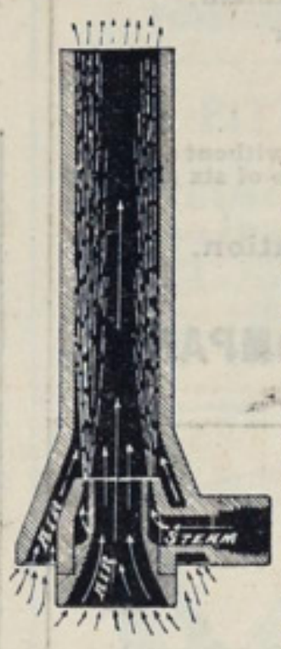

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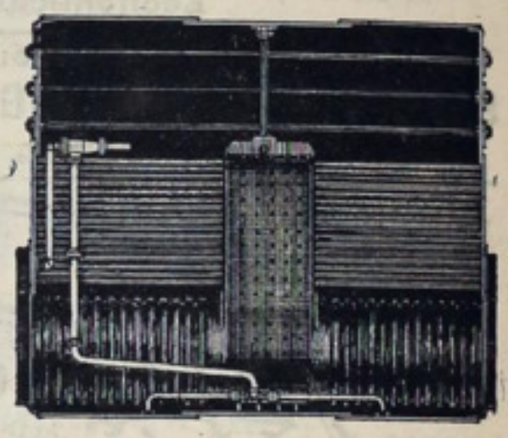

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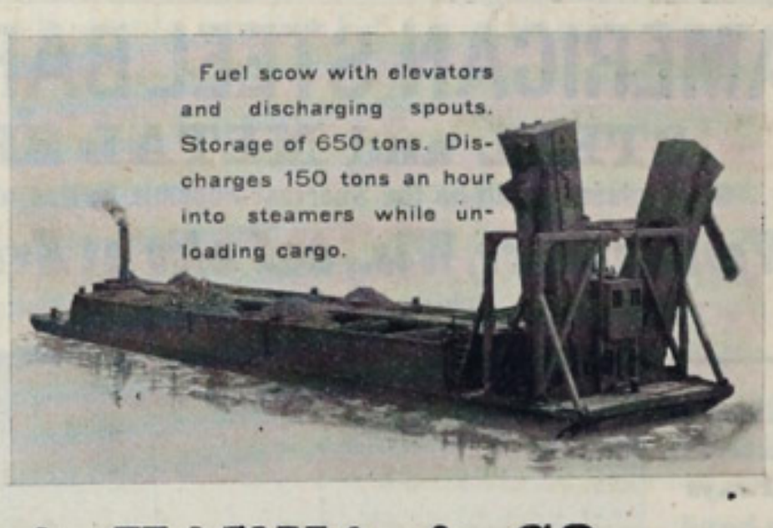
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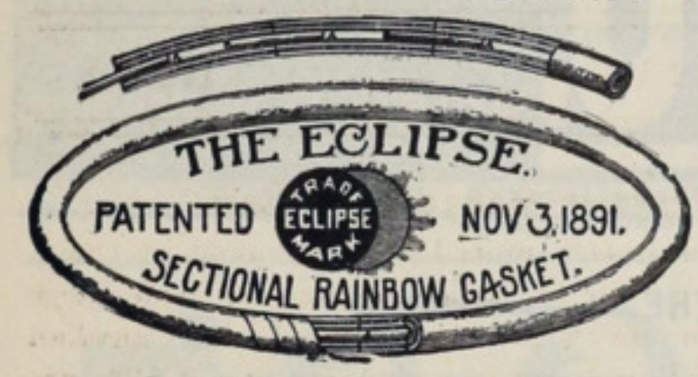

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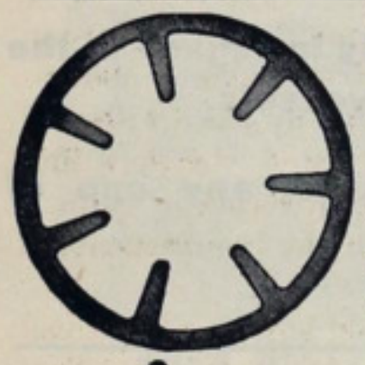

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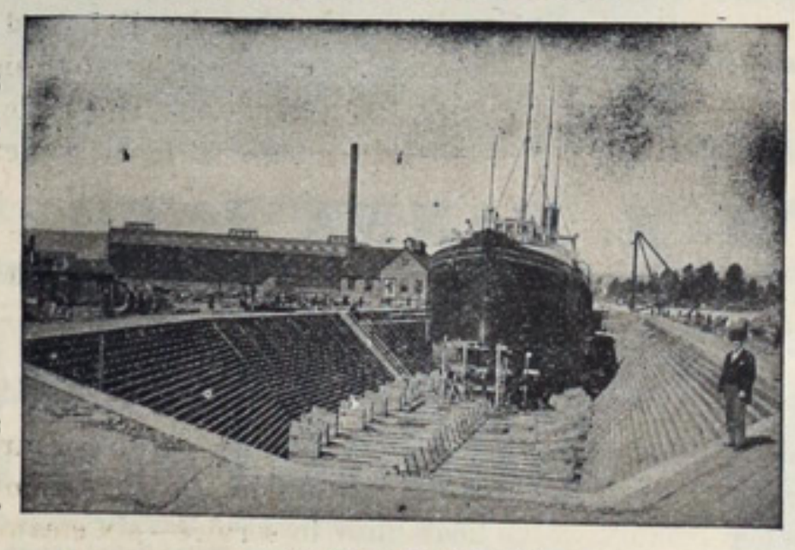

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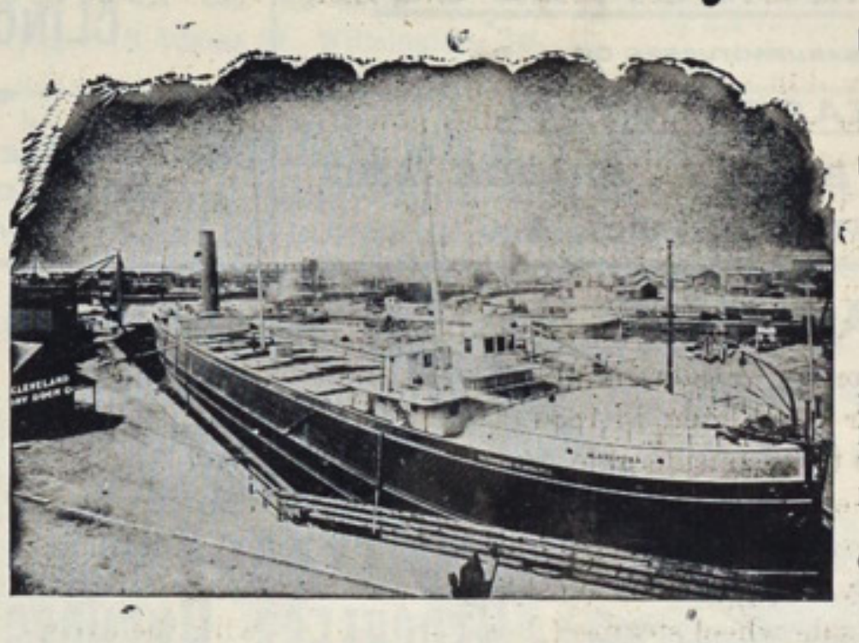

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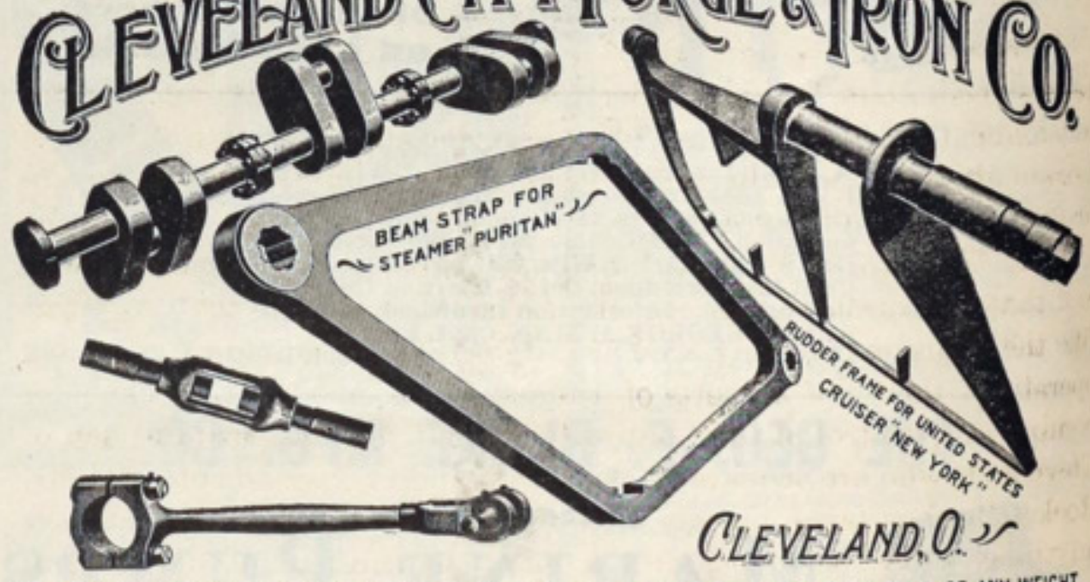

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UNITED STATES ENGINEER OFFICE, Duluth, Minn., Sept. 20, 1896. Sealed proposals for rip rap embankment at Agate Bay (Two Harbors), Minn., will be received until noon, Oct. 20, 1896, and then publicly opened. Information given on application. CLINTON B. SEARS, Maj., Engrs. Oct. 17.